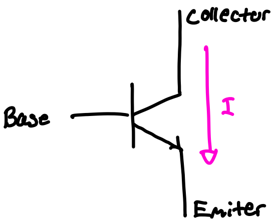
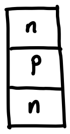
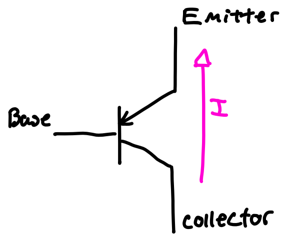
Transistor

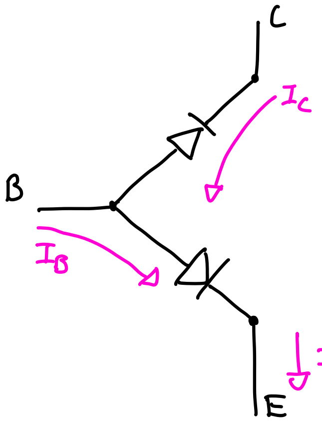


npn transistor





PnP transistor



$I_E = I_B + I_C$

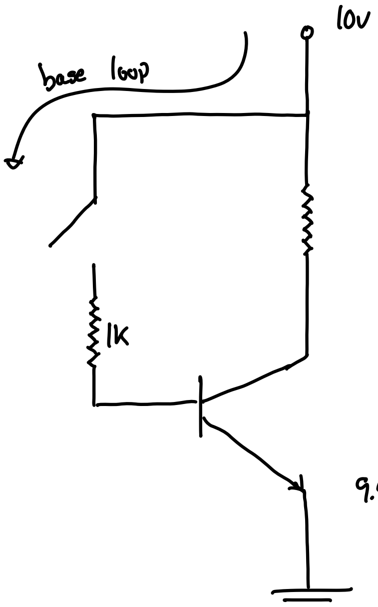
For transistor to be on:

→ Polarity: collector must be more positive than emitter

→ Junctions: base-emitter is forward biased

base-collector is reversed-biased

$I_c = h_{FE} I_B = \beta I_B$



10V, 0.1A loop

$R = \frac{V}{I} = 100\,\Omega$

if $\beta = 100$ Capable of $I_c = \beta I_B = (100)(9.4\,mA) = 940\,mA$

$I_B + I_c = I_E$

$9.4\,mA + 94\,mA = 103.4\,mA$

Base loop

$10V - I_B(1K) - 0.6V = 0$

$I_B = \frac{9.4V}{1K}$

$I_B = 9.4\,mA$

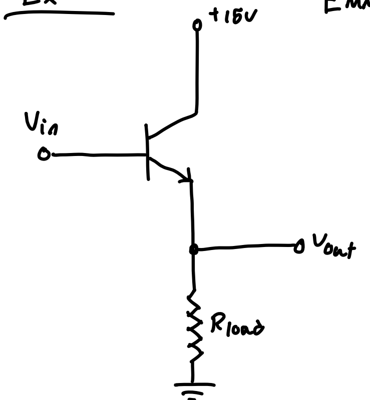
Collector loop

$10V - I_c(0.1k) - 0.6V = 0$

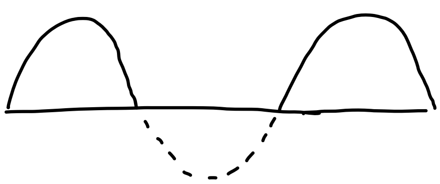
$I_c = \frac{9.4V}{100\,\Omega}$

$I_c = 94\,mA$

Ex



Emmiter Follower



$V_{out} = V_{in} - 0.6V \approx V_{in}$

dynamic resistance, $r = \frac{\Delta V}{\Delta I}$

$\Delta I_E = \frac{\Delta V_E}{R_{load}} = \frac{\Delta V_B}{R_{load}}$

$I_E = I_c + I_B = \beta I_B + I_B$

$I_E = I_B(\beta+1)$

$\Delta I_E = (\beta+1)\Delta I_B$ $\quad \Delta I_B = \frac{\Delta I_E}{\beta+1}$

$\Delta I_B = \frac{\Delta V_B}{(\beta+1)R_{load}}$ $\quad \therefore Z_{in} = \frac{\Delta V_B}{\Delta I_B} (\beta+1)R_{load}$

$Z_{in} \simeq \beta R_{load}$